

CLAIMS

WHAT IS CLAIMED IS:

1. A fuel cell electrical power generation system comprising:

5 a reformer (5) through which an oxygen-containing gas and a source gas are flowed and which has a catalytic part for causing the partial oxidation of hydrocarbons contained in said source gas, and

a solid electrolyte fuel cell (7) which is disposed downstream of said reformer (5) and which has a cell main unit which includes: a fuel electrode (35) which is
10 supplied with a partial oxidation gas which contains hydrogen generated as a result of the flowing of said source gas and said oxygen-containing gas through said reformer (5); an oxygen electrode (31) which is supplied with an oxygen-containing gas; and an electrolyte (33) which lies between said fuel electrode (35) and said oxygen electrode (31), wherein an electrode reaction of said partial oxidation gas and said oxygen-
15 containing gas is caused to take place in said fuel electrode (35), said oxygen electrode (31) and said electrolyte (33).

2. A fuel cell electrical power generation system comprising:

a reformer (5) having a catalytic part which when a source gas is flowed
therethrough converts hydrocarbons, contained in said source gas and having a carbon
20 number equal to or greater than 2, into methane under the presence of hydrogen, and which when an oxygen-containing gas and said source gas are flowed therethrough causes the partial oxidation of hydrocarbons contained in said source gas, and

a solid electrolyte fuel cell (7) which is disposed downstream of said reformer (5) and which has a cell main unit which includes: a fuel electrode (35) which is
25 supplied with a hydrogen-containing gas; an oxygen electrode (31) which is supplied

with an oxygen-containing gas; and an electrolyte (33) which lies between said fuel electrode (35) and said oxygen electrode (31), wherein an electrode reaction of said hydrogen-containing gas and said oxygen-containing gas is caused to take place in said fuel electrode (35), said oxygen electrode (31) and said electrolyte (33),

5 said fuel cell electrical power generation system performing:

 a startup operation in which said source gas and said oxygen-containing gas are flowed through said catalytic part of said reformer (5), and a partial oxidation gas which contains hydrogen generated as a result of the flowing of said source gas and said oxygen-containing gas through said reformer (5) is supplied to said fuel electrode
10 (35) as said hydrogen-containing gas, and

 a normal operation in which said source gas is flowed through said catalytic part of said reformer (5) and a fuel gas which contains methane generated as a result of the flowing of said source gas through said reformer (5) is supplied to said fuel electrode (35).

15 3. The fuel cell electrical power generation system of claim 1 or claim 2 further comprising:

 first heat exchange means (6) for performing heat exchange between said source gas and said oxygen-containing gas prior to their entry into said reformer (5) and said partial oxidation gas discharged out of said reformer (5).

20 4. The fuel cell electrical power generation system of claim 1 or claim 2 further comprising:

 first combustion means (4) for burning said source gas and said oxygen-containing gas during the startup phase of said reformer (5), and

 first combustion gas supply means (16) for supplying to said reformer (5) a
25 combustion gas generated as a result of the burning of said source gas and said

oxygen-containing gas in said first combustion means (4) so that said reformer (5) is heated.

5. The fuel cell electrical power generation system of claim 1 or claim 2 further comprising:

5 second combustion means (8) for burning said source gas and said oxygen-containing gas before said electrode reaction starts taking place, and

second combustion gas supply means (57, 59) for supplying to said oxygen electrode (31) a combustion gas generated as a result of the burning of said source gas and said oxygen-containing gas in said second combustion means (8) so that said
10 oxygen electrode (31) is heated.

6. The fuel cell electrical power generation system of claim 1 or claim 2 further comprising:

third combustion means (12) for burning a source gas and a first oxygen-containing gas,

15 second heat exchange means (93) for performing heat exchange between a combustion gas generated as a result of the burning of said source gas and said first oxygen-containing gas in said third combustion means (12) and a second oxygen-containing gas different from said first oxygen-containing gas, and

oxygen-containing gas supply means (75, 83, 87) for supplying to either or both
20 said reformer (5) and said oxygen electrode (31) said second oxygen-containing gas heated by said second heat exchange means (93).